

Water Quality Watch

Chesterfield County Resource Protection Area Restoration Guide



Chesapeake Bay Preservation Act Resource Protection Areas

Background

In 1989, the Virginia General Assembly adopted the Chesapeake Bay Preservation Act. The purpose of that law is to “protect and improve the water quality of the Chesapeake Bay, its tributaries, and other state waters by minimizing the effects of human activity upon these waters.” In Chesterfield County there are approximately 1,300 miles of perennial and intermittent streams and approximately 95 miles of riverfront along the James and Appomattox rivers. All of these waters are important resources to the residents of Chesterfield County and drain to the Chesapeake Bay. The county adopted a local ordinance to carry out the requirements of the Bay Act in 1991.

A key component of the Chesapeake Bay Preservation Act and its regulations is the identification of “lands adjacent to water bodies with perennial flow that have an intrinsic water quality value due to the ecological and biological processes they perform or are sensitive to impacts that may result in significant degradation to the quality of state waters.” Such lands are known as Resource Protection Areas or RPAs. They also are referred to generically as riparian buffers.

If you live near one of these areas that has been left in its natural state, you may notice that there are several layers of vegetation. Typically, an undisturbed RPA contains a dense tree canopy, understory trees, shrubs and leaf or pine litter. Similar to the various parts of an engine, these RPA components serve different functions. The tree canopy reduces the erosive effects of rain; the roots of the vegetation consume or “take up” both nitrogen and phosphorus; the leaf and other vegetative “litter” convert toxic substances contained in lawn care products to a less toxic form; and tree limbs and other larger vegetative debris serve to obstruct sediment particles from entering the adjacent water body. All of these components work together to significantly reduce the amount of pollutants entering nearby water bodies.

When an RPA is being restored either voluntarily or as directed through an enforcement proceeding, the goal is to come as close as possible to achieving the original function described above.

The Chesterfield County Department of Environmental Engineering has produced this manual to serve as a how-to guide for the restoration of RPAs. Our mission is to protect, maintain, and restore the chemical, physical and biological integrity of Chesterfield County’s waters. This mission furthers one of the county’s strategic goals: To be responsible protectors of the environment. For more information, call (804) 748-1035.



*Funding for this project was provided
by the Chesapeake Bay Small Watershed
Grant Program and The National Fish
and Wildlife Foundation.*



*Providing a **FIRST CHOICE** community through excellence in public service*

What are Resource Protection Areas?

The Chesapeake Bay Preservation Act

In 1988, The Virginia General Assembly enacted the Chesapeake Bay Preservation Act. The act requires local governments to include water quality protection measures in their zoning and subdivision ordinances and in their comprehensive plans. In October 1990, Chesterfield County adopted the Chesapeake Bay Preservation Ordinance to protect environmentally sensitive lands known as Chesapeake Bay Preservation Areas. The most sensitive of these are called Resource Protection Areas.

What are Resource Protection Areas?

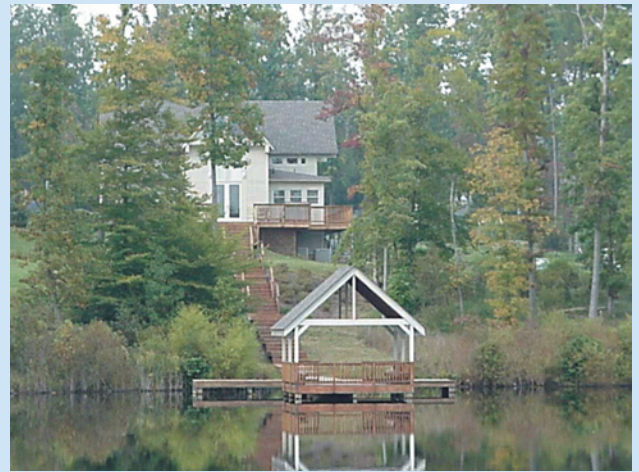
Resource Protection Areas, or RPAs, are the corridors of environmentally sensitive land that lie alongside or near the shorelines of streams, rivers and other waterways. In their natural condition, RPAs protect water quality. RPAs filter pollutants from storm-water runoff, reduce the volume of storm-water runoff, prevent erosion, and perform other important biological and ecological functions. The components of an RPA include:

- Tidal wetlands
- Tidal shores
- Non-tidal wetlands connected by surface flow and adjacent to tidal wetlands or tributary streams
- A 100-foot buffer landward of the above features

In Chesterfield County, RPAs are located adjacent to the James and Appomattox rivers, Falling Creek, Lake Chesdin and Swift Creek reservoirs, and to more than 500 miles of perennial streams (streams that flow all year long) throughout the county. The James and Appomattox rivers are tributaries to the Chesapeake Bay. All of our streams are tributaries to these two rivers.

Why should we protect our waters?

Streams, lakes and rivers are key ingredients in our quality of life. They support a wide variety of plants, animals and aquatic life. People also enjoy them as visual and recreational resources. In Chesterfield County, a high percentage of homeowners benefit from living near a stream, river or other water body. Chesterfield County is committed to protecting our waters because they are valuable community assets.



What happens if Resource Protection Areas are not properly managed?

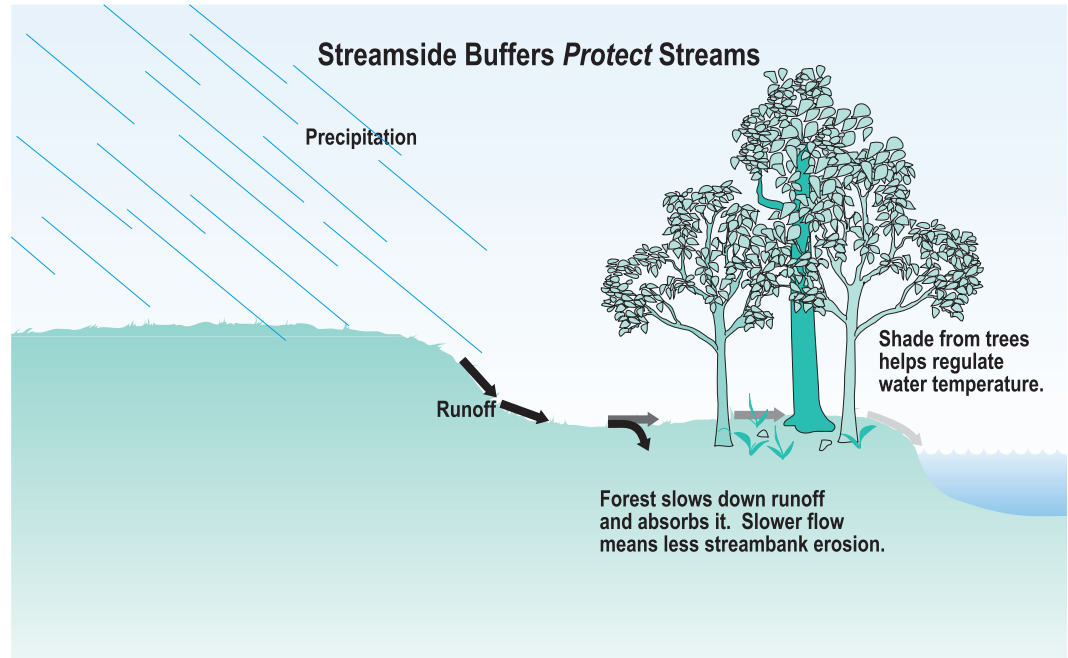
Because RPAs are so close to water bodies, disturbing them allows more pollutants to enter our waters and, eventually, the Chesapeake Bay. Storm-water runoff picks up and carries oil from roads, soil from construction sites, fertilizers and pesticides from farms and lawns, harmful bacteria from pet and farm animal wastes, and trash. In many areas, storm water is one of the leading causes of surface-water pollution. Poorly managed RPAs, or the lack of protected stream corridors, may result in other impacts, such as stream bank and channel erosion, habitat destruction and a reduction in the stream's biodiversity.

Why are Resource Protection Areas so important?

A naturally vegetated RPA, or buffer, acts as a *stream protector, filter, transformer, nutrient sink* and a *food source*. These critical functions enable the RPA to remove pollutants from storm-water runoff and protect the stream or other water body.

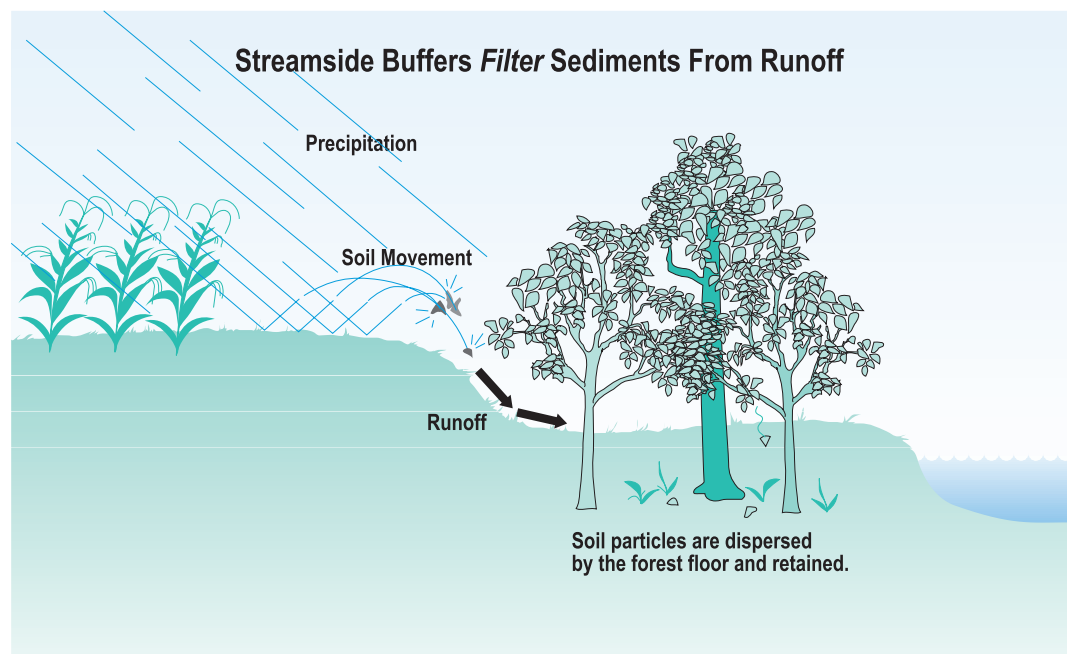
As a protector ...

Trees and other plants in the RPA help to stabilize stream banks and limit erosion in the stream channel. An RPA reduces the volume of storm-water runoff coming from developed areas outside the RPA by slowing it down and allowing it to be absorbed into the soil before it reaches the stream. This helps maintain the base flow of water draining to streams during periods of drought. Tree canopies in an RPA provide shade for streams, which moderates increases in water temperature and supports aquatic life. Finally, an RPA provides scenic and recreational value to surrounding areas, as well as habitat for a variety of wildlife.



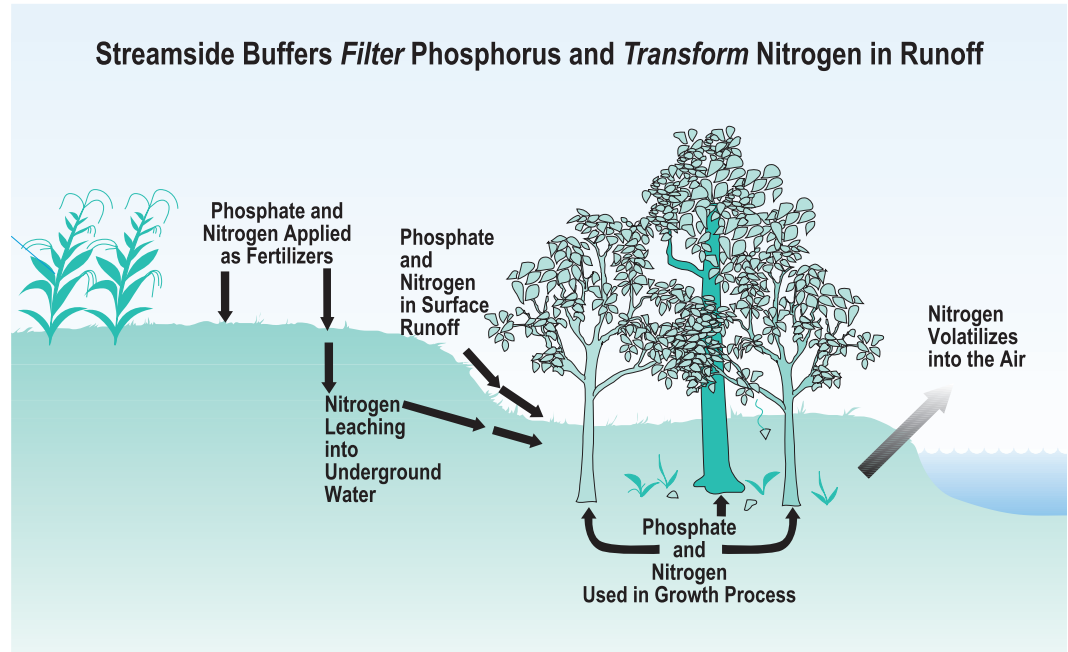
As a filter ...

The RPA reduces the amount of sediment and nutrients, such as phosphorus and nitrogen in fertilizers that are carried by storm-water runoff. In water bodies, sediment smothers plants and clogs fish gills. As storm water passes through an RPA, sediment settles out or is stopped by vegetative litter, leaves, twigs, etc., on the ground. Phosphorus, which clings to soil particles, is trapped through this filtering action and is used by the plants in the RPA.



As a transformer ...

The chemical and biological processes in an RPA actually change the chemical structure of some pollutants. The soil can transform nitrogen in storm water runoff and in decaying organic debris into mineral forms, which can then be converted into proteins by plants or bacteria. Toxic chemicals in pesticides and herbicides also are changed into nontoxic forms by biodegrading forces at work in the soil and vegetative litter.



As a nutrient sink ...

The RPA vegetation takes up nutrients such as phosphorus and nitrogen into plant tissue. In RPAs with moist soils, nutrients in leaf litter can be stored for long periods of time. Excess nutrients that reach streams may make algae grow too fast, which kills fish and blocks the sunlight that other aquatic plants need.

Under the Chesapeake Bay Preservation Ordinance, activities and uses that are permitted and not permitted in the RPA include:

Permitted

- Water-dependent facilities, such as docks, piers and public beaches
- Rebuilding existing structures
- Water wells, boardwalks, trails, pathways and public utility structures
- Selectively removing trees, for reasonable sight lines and vistas or pedestrian walkways (created using natural materials)
- Removing dead or dying vegetation

Not Permitted

- New development
- Additions to existing structures
- Parking lots
- Secondary structures, such as sheds and gazebos
- Clear-cutting trees
- Filling and grading activities
- Establishing lawns

As habitat and a food source ...

The plants in an RPA serve as an important source of food and shelter for birds and other wildlife. The RPA is also an important part of the food chain in the adjacent stream. Materials such as fallen limbs and leaves, as well as insects, provide a source of food for small organisms in streams. When those small organisms are consumed by larger aquatic life, the energy from that food base is passed along.

What activities are permitted in a resource protection area?

The Chesapeake Bay Preservation Ordinance requires that a 100-foot buffer, which is called the conservation area component of the RPA, be maintained in a manner "that retards runoff, prevents erosion, and filters nonpoint source pollution from runoff."

Can trees be removed to establish a view of a lake or water body?

The County's Chesapeake Bay Preservation Ordinance permits establishing "reasonable" sight lines, but only if approved by the Office of Water Quality. In keeping with the intent of the State's Chesapeake Bay Preservation Act, any vegetation that has been removed must be replaced with vegetation that offers an equivalent level of water-quality protection. Planting appropriate vegetation, such as native shrubs and ground covers, that don't grow as tall, may provide such protection. Even better, pruning tree branches at viewing level provides the desired view without removing the tree and the water quality protection it provides.

Consequences of Noncompliance with Resource Protection Area Requirements

The Chesapeake Bay Ordinance states that a “vegetated conservation area that retards runoff, prevents erosion and filters nonpoint source pollution from runoff shall be retained, if present, and shall be established in areas where it does not exist.” The ordinance further states “in order to maintain the conservation area’s functional value, indigenous vegetation may only be removed to provide for reasonable sight lines, pedestrian ways, general woodlot management and best management practices.”

Clear-cutting trees, removing other types of vegetation and making other significant modifications to RPAs does not comply with these requirements, and more importantly, may result in water quality problems in nearby waters. Such noncompliance may result in penalties. Violators will be required to restore the RPA to as close to the original condition and in accordance with county guidelines. An RPA Restoration Plan must be developed and submitted to the Water Quality Section for review and approval. The objective of the plan is to restore the RPA’s primary functions, so that the RPA may again remove pollutants from storm-water runoff. It is not enough to simply allow vegetation to “come back” on its

own. It will take too long to restore the buffer’s pollutant removal and other functions. To be most effective, three tiers of vegetation should be established in the buffer:

- Ground cover
- Understory (small, understory trees and shrubs)
- Overstory (large, canopy trees)

A basic RPA Restoration Plan must include the following elements:

- Owner name and contact information
- Site Analysis
 - See page 7 for all site analysis components
- Planting Plan
 - See page 10 for all planting plan components
- Site Analysis and Planting Plan Forms can be found in the back of this manual

For all RPA enforcement actions, the county will require that a bond be posted, to cover the cost of plant material and labor for installation

Restoration Procedure

Step 1 - The RPA violation is reported to the Water Quality Section.

Step 2 - Water Quality staff meets in the field with the property owner to confirm the violation and determine the extent of the RPA disturbance.

Step 3 - Water Quality staff meets with the property owner to review the requirements for an RPA Restoration Plan. This discussion includes the numbers and types of plants to be planted as well as the timing of the planting.

Step 4 - The RPA Restoration Plan is submitted. The Water Quality Manager reviews the plan and suggests final changes, if necessary.

Step 5 - Once the Restoration Plan has been approved, the property owner may proceed with the purchase and installation of the plantings in accordance with the plan.

Step 6 - After the plants have been installed, Water Quality staff will inspect the site to determine whether the plantings have been installed as called for in the Restoration Plan.

Citizen steps to complete a site analysis for RPA restoration

The site analysis describes the existing conditions of the disturbed area. Potential conditions to include in the site analysis description are included on the checklist below. In developing a map of the existing site, include a north arrow, scale and any additional information about the site or surrounding landscapes.

Site Analysis Check List

- Property line locations.
- Limits of Resource Protection Area (RPA) and estimated square footage for restoration planting.
- Location of water's edge.
- Easements and other legal restrictions on the property.
- Percentage and type of ground cover: grass or lawn, leaf litter or mulch (ideal amount is 2-3 inches), bare soil (vegetation removed and raked), small non-woody plants and vines forming a green groundcover.
- Soil conditions: well drained, partially wet or mostly saturated.
- Slope (to calculate see note below): no slope (flat), some slope (0-8%), steep slope (greater than 8%).
- Sunny and shady areas.
- Estimated number and type of existing canopy (large) trees existing in the affected area.
- Estimated number and type of existing small trees and shrubs in the affected area.
- Existing structures located in and adjacent to the RPA.
- Drain field/septic or county sewer.

Calculating percentage of slope:

(a) measure from where the slope begins on the site to where it ends (this distance is referred to the run or length of the elevation change).

(b) estimate the distance changed from the bottom of the slope to the top to difference in elevation (this distance is referred to the rise or height of the elevation change).

(c) calculate the change in elevation or percentage of slope by dividing the elevation change by the distance or rise (b)/run (a) = percentage of slope (c)

General Guidelines for the Restoration of Resource Protection Areas

The purpose of this section is to provide general guidance on the restoration of Resource Protection Areas, whether it is being done voluntarily or as part of an enforcement proceeding. As stated in the state regulations pertaining to the Chesapeake Bay Preservation Act and Chesterfield County's Chesapeake Bay Preservation Ordinance, "... a 100-foot wide buffer area of vegetation that is effective in retarding runoff, preventing erosion, and filtering nonpoint source pollution from runoff shall be retained if present and established where it does not exist." The regulations further state that "the 100-foot wide buffer areas shall be deemed to achieve a 75 percent reduction of sediments and a 40 percent reduction of nutrients." These reduction rates are what have been observed in a fully forested, natural buffer. These two requirements serve as the guiding principle in replanting an RPA that has been cleared or significantly modified.

There are two types of plantings that may occur in the riparian buffer – a replacement planting or a restoration planting. A replacement planting would be acceptable if a small amount of vegetation was removed during an activity such as creating a sight line. Generally, to use the replacement-planting rates, a known number of trees and/or vegetation was removed and can be replaced according to the planting rates as specified on Table 1. If a large amount of vegetation has been disturbed, or the buffer has been illegally cleared, a restoration planting must occur. The planting rates for a restoration planting under a quarter of an acre can be found on Table 2, while the planting rates for plantings greater than a quarter of an acre are listed on Table 3.

- Plant not only trees or shrubs, but also other layers of vegetation so that, over time, the area will closely resemble a forested buffer.
- Establish a community of plants similar to what may be found in a natural, undisturbed buffer near the site of the restoration. The density, spacing and distribution of the species that naturally occur should be replicated to the maximum extent practicable.
- Utilize the plant list contained in this manual. Be sure to avoid using invasive species such as kudzu, Johnson grass and similar species.
- Be sure to follow planting specifications discussed in this manual and the recommendations of certified nurseries or landscape contractors. Note that in restoring the RPA, plant spacing requirements should be denser than what the vegetation can support at full maturity. By over-planting in this manner, the RPA pollutant reduction functions that were eliminated or significantly reduced will receive a jump start. The denser the vegetation, the greater the amount of nutrient removal achieved by the newly established plants.
- Use several inches of mulch, tree shelters, grass mats or similar methods to ensure the survivability of the plant material.
- Allow the vegetative "litter" to build up over time, as this material is effective in removing pollutants from storm-water runoff.
- Do not replant the buffer with a lawn.

Planting Density and Ratios

Table 1. Replacement Planting Rates

VEGETATION REMOVED	PREFERRED REPLACEMENT VEGETATION	ACCEPTABLE ALTERNATIVE VEGETATION
1 tree or sapling 1/2"-2 1/2" caliper	1 tree at equal caliper or greater	Or 2 large shrubs at 3'-4' Or 10 small shrubs or woody groundcover * at 15"-18"
1 tree > 2 1/2" caliper	1 tree at 1 1/2" - 2" caliper, or 1 evergreen tree at 6' min. ht, per every 4" caliper of tree removed (ex: a 12" cal. tree would require 3 trees to replace it)	Or 75% trees at 1 1/2" - 2" and 25% large shrubs at 3'-4' per every 4" caliper of tree removed. (ex: a 16" cal. tree removed would require 3 trees and 1 large shrub) Or 10 small shrubs or woody groundcover at 15"-18" per 4" caliper of tree removed (ex: a 8" caliper tree removed requires 20 small shrubs.)
1 large shrub	1 large shrub at 3'-4'	Or 5 small shrubs or woody groundcover at 15"-18"
<ul style="list-style-type: none"> Woody groundcover is considered to be a woody, spreading shrub that remains close to the ground, to 18" high, such as a shore juniper, juniperus conferta. Vines may not be considered "woody groundcover" for the purpose of vegetation replacement. 		

Table 2. Restoration Planting Rates

if disturbance is 1/4 acre or less

For every 400 square-foot unit (20'x20') or fraction thereof plant:

one (1) canopy tree at 1 1/2" - 2" caliper or large evergreen at 6'

two (2) understory trees at 3/4" - 1 1/2" caliper or evergreen at 4'

or one (1) understory tree and two (2) large shrubs at 3'-4'

three (3) small shrubs or woody groundcover at 15" - 18"

Table 3. Restoration Planting Rates

if disturbance is greater than 1/4 acre

For the waterside 50% of the buffer (from the waterline inland for the first 50 feet):

Use the planting rules in Table 2.

For the landward 50% of buffer (from 50 feet inland to 100 feet inland):

Plant bare root seedlings or whips at 1,210 stems per acre, approximately 6'x 6' on center (minimum survival required after two growing seasons: 600 plants,)

Or

Container grown seedling tubes at 700 per acre approximately 8'x 8' on center (minimum survival required after two growing seasons: 490 plants)

(Information from Riparian Buffers Guidance Manual Chesapeake Bay Local Assistance Department)

Citizen steps to prepare a planting plan for RPA restoration

Planting Calculations

The restoration area identified in the site analysis is used as the basis for calculating the number of plants required for the disturbed area. The planting plan on page 11 shows a 100 feet x 100 feet area or 10,000 square feet requiring restoration. The total square footage is divided by 400 square feet (20 feet x 20 feet) to result in 25 total units of restoration needed (see calculations below).

Number of plants needed are determined using the following formula:

$$10,000 \text{ SF} / 400 \text{ SF Units} = 25 \text{ units}$$

<u>Units</u>	x	<u>Plant/Unit</u>	=	<u>Number of Plants</u>
25 Units		1 canopy tree		25 canopy trees
		2 understory trees		50 understory trees
		3 small trees		<u>75 small shrubs</u>
				150 total plants

Types of Restoration Plants

Canopy Tree - A woody plant having a single main stem with few to no branches on the main stem and can reach 30 feet or more at maturity.

Understory Tree - A woody plant having a single main stem with few or no branches on its main stem that grows under the forest canopy and reaches approximately 15-30 feet at maturity.

Shrub - A multi-stem woody plant less than approximately 15 feet high either without a main stem or with branches persisting on the main stem close to its base.

Plant Selection

Plant selection should be based on existing and surrounding native vegetation. Refer to the plant list on pages 13-23 for guidance. The list should be organized using the categories listed below. Each plant should be labeled or identified using a unique symbol. The plant list should accompany the map of the planting plan.

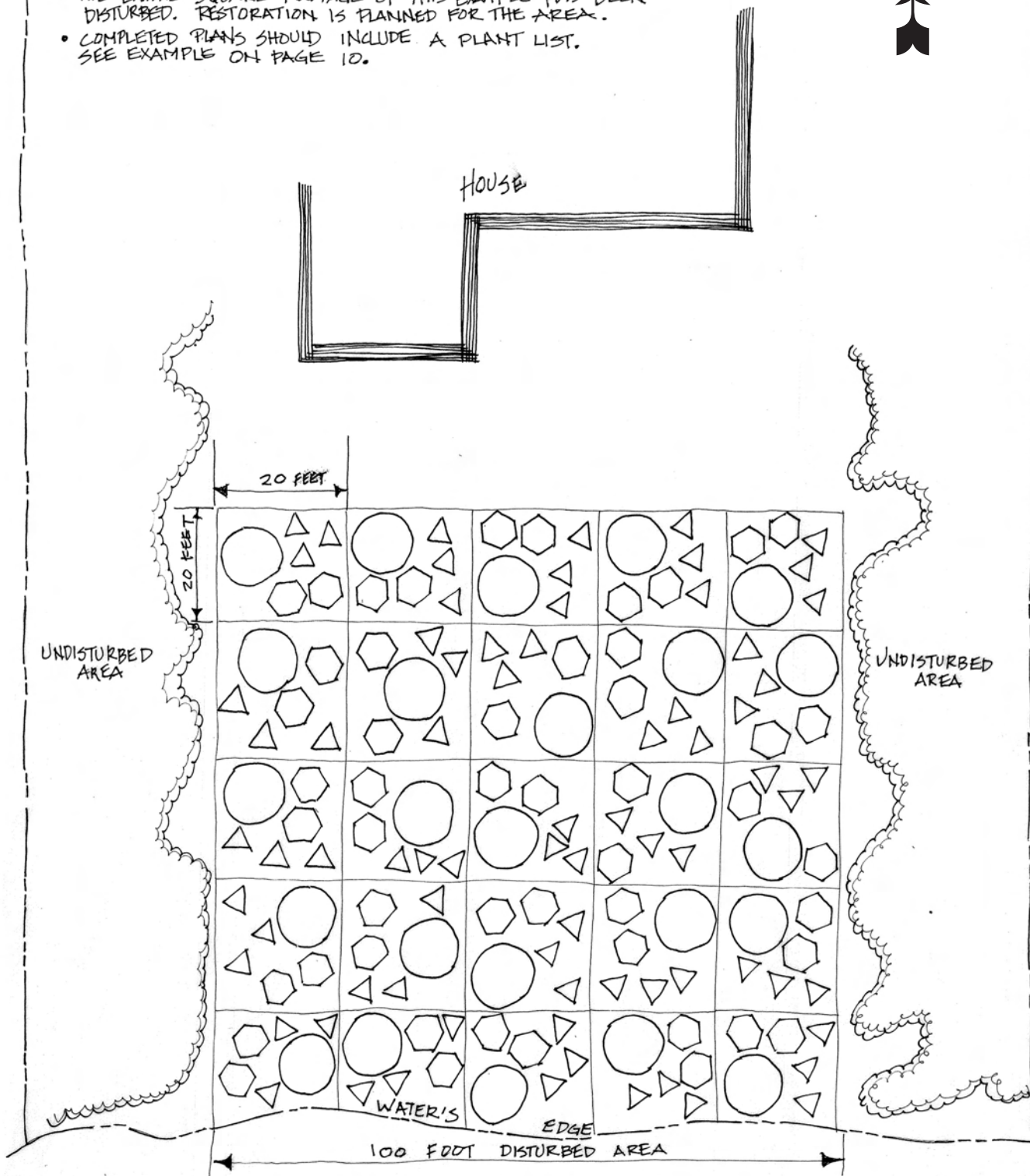
Common name	Scientific name	Plant size	# of plants
Canopy (large trees)	Select 2 to 3 different species	In height or caliper of trunk	Base on disturbed area calculations
Understory (small trees and shrubs)	Select 3 to 5 different species	In height or container size	Base on disturbed area calculations
Small shrubs	Select 3 to 5 different species	Container size or flats	Base on disturbed area calculations

Planting Schedule and Costs

Please identify the date on which the planting will be completed as well as the estimated cost of the plant material. Include labor costs if a contractor is to be used for the planting.

PLANTING PLAN

- THE ENTIRE SQUARE FOOTAGE OF THIS EXAMPLE HAS BEEN DISTURBED. RESTORATION IS PLANNED FOR THE AREA.
- COMPLETED PLANS SHOULD INCLUDE A PLANT LIST. SEE EXAMPLE ON PAGE 10.



Guidelines for Planting

STEP 1: SELECT THE RIGHT PLANTS: Select native trees and shrubs that are well adapted to the conditions of your site. If the plants have wire baskets, the top few grids or sections should be cut and removed once the tree is in the hole. This will prevent the tree roots from being girdled by the wire as they grow. Also remove any rope on the tree and cut slits in burlap to allow the roots to get out.

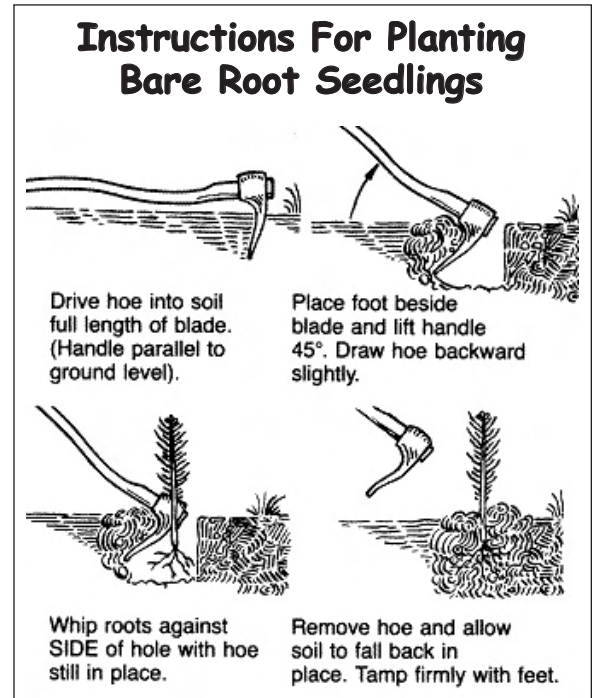
STEP 2: EVALUATE THE SOIL: Test soil drainage before planting. Dig a hole the depth of your planting hole and fill it with water. If the water drains at a rate of less than 1 inch per hour, consider native plants that don't mind wet soil conditions. Break up clay soils or hoe as much as possible before planting. The best time to plant is during the dormant season. (October-March.)

STEP 3: PLANT SPACING: Attempt to re-create the random spacing that occurs naturally. Plant herbaceous plants 1 to 2 feet apart. Plant shrubs and small trees 5 to 8 feet apart, and large trees 10 to 15 feet apart.

STEP 4: DIG THE HOLE: Dig shallow planting holes three to five times as wide as the root ball. Dig holes as deep as the root ball. In clay soils, dig holes 1 to 2 inches shallower than the root ball and cover the top of the root ball with mulch. Don't dig holes deeper than the root balls or put loose soil beneath the roots. Loose soil will settle and compact causing the plant to then be planted too deep. Call Miss Utility at (800) 552-7001 before digging.

STEP 5: BACKFILL THE HOLE, FERTILIZE AND WATER: Backfill holes with soil that has not been amended with organic matter such as peat moss. Backfill half the soil into the hole, then water the plant thoroughly to settle out the air pockets. Finish filling the hole with dirt, and water again.

STEP 6: MULCH: Cover exposed root ball tops and the area around the plant with 2 to 3 inches of organic mulch. Don't allow mulch to touch the trunks of the shrubs and trees. Extend mulched areas out as wide as possible beyond the new plantings. Mulched beds improve the growth of shrubs and trees.



Care for newly planted landscapes

- Remove tags and labels from plants.
- Water new plants to promote root growth.
- Mulch with 2 to 3 inches of organic mulch.
- Keep mulch away from tree trunks and shrub stems.
- Don't use plastic beneath the mulch around trees and shrubs because it blocks air and water exchange. (Consider landscape fabrics for weed control.)
- Most trees do not need to be staked. Only stake trees with large crowns for one year.
- Remove any rope, tags, etc., from plants within one year of planting.
- Do not use wire on tree bark. If staking is needed, consider using 1-inch fabric material around tree trunks if necessary.
- Most trees should not have their trunks wrapped.
- Prune to control shape, remove dead, damaged or diseased branches. It is best to prune in winter or early spring.

Resource Protection Area Plant List

The list contained in this manual includes plants that are native to Virginia and are well adapted to the conditions commonly found in a riparian buffer. The list is broken down into the categories of canopy trees, understory trees, large shrubs, small shrubs and additional plants. The plants are listed alphabetically by their Latin names, with common names in bold letters. Information about light and moisture requirements is included along with a brief description of the plants' characteristics.

Why use native plants?

Native plants are adapted to the local soil, rainfall and temperature conditions, and have developed natural defenses to withstand many types of insects and diseases. Because of these traits, native plants will grow without a lot of maintenance. Wildlife species evolve with plants, therefore, they use native plant communities as their habitat. Non-native plants can be invasive and will smother vegetation. This can cause the ecosystem to lose plant diversity, and destroy habitat and food sources for wildlife.

Wildlife benefits

Most of the plants listed provide some type of food or shelter for wildlife. A list of some of the species that are known to use the plant is given. The plant however, may provide food and shelter to many other species that are not listed.

Soil

Many of the plants on the list grow in a variety of soil types, so soil information was omitted. It is always wise to contact the Chesterfield County Cooperative Extension office for a soil test prior to selecting plants. You will especially want a test if your site has soil that is heavily compacted, sandy or has heavy clay. Chesterfield County Cooperative Extension can be reached at 751-4401.

Site design

Arrange your native plants in aggregate groups or groves rather than individual plants surrounded by a lawn. Aggregate plantings resemble natural plant communities that wildlife use as habitat. Do not plant on a grid pattern with plants evenly spaced. Attempt to re-create the random spacing that occurs in natural plant communities. Loosely group similar species together and allow them to overlap and intersperse with other species. If you are interested in attracting wildlife, incorporate feeders and nesting boxes, and, if needed, a source for water into your planting.

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
CANOPY TREES			
Red Maple Acer rubrum	Light: partial to full sun Moisture: wet to well drained (Tolerates flooding)	Red March bloom, red fall color, medium to fast growth rate, height 40'-60', aggressive - do not over plant	Food: Seeds and sap. Wildlife: chickadees, robin, cardinal, finches, chipmunk, deer
Red Buckeye Aesculus pavia	Light: shade to full sun Moisture: moist well drained soil, dislikes dry soil	6" panicles of salmon to medium red flowers in spring short lived; blooms at early age, moderate growth rate height, 10'-20'	Flowers attract hummingbirds
Eastern Red Cedar Juniperus virginiana	Light: full sun Moisture: well drained to dry	Narrow shape, thick foliage, many blue berries, nesting site for a variety of birds, medium growth rate, height 30'-50'	Food: berries Wildlife: quail, woodpeckers, robin, bluebird, warblers, grosbeaks, cedar waxwing, mockingbird, deer
Southern Magnolia Magnolia grandiflora	Light: partial shade to full sun Moisture: well drained soil; tolerates high moisture	Large fragrant flowers and dense foliage, slow to moderate growth rate, height 40'-80'	Food: seeds, fruit Wildlife: squirrels, attracts a variety of birds, good value as a cover tree for nesting

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Virginia Pine <i>Pinus virginiana</i>	Light: full sun Moisture: well drained to dry	Colonizer of dry sites, 1"-3" needles, medium growth rate, height 50'-80'	Food: seeds, needles Wildlife: doves, chickadees, nuthatches, beaver, squirrel, deer
Loblolly Pine <i>Pinus taeda</i>	Light: full sun Moisture: wet to moist	Long needles, open branches, fast growth rate, height 70'-90'	Food: sap Wildlife: doves, woodpeckers, nuthatches, brown creeper, finches, squirrels
Short Leaf Pine <i>Pinus echinata</i>	Light: full sun Moisture: well drained to dry	Fire and drought tolerant, fast growth rate, height 80'-100'	Food: seeds, needles Wildlife: a variety of songbirds, dove, turkey, small mammals, needles used for nest construction
River Birch <i>Betula nigra</i>	Light: partial to full sun Moisture: wet to well drained (Tolerates flooding)	Unique peeling reddish-white bark, medium to fast growth rate, height 30'-50'	Food: fruit, sap, buds. Wildlife: ducks, nuthatches, chickadees, finches, fox sparrow, rabbit
Shagbark Hickory <i>Carya ovata</i>	Light: Partial to full sun Moisture: moist	Common along streams and on moist hillsides, golden yellow fall color, slow growth rate, height 70'-90'	Food: nuts Wildlife: deer, turkey, wood duck, fox, squirrel, chipmunk
Mockernut Hickory <i>Carya tomentosa</i>	Light: shade to full sun Moisture: dry to wet	Beautiful yellow fall color, height 60'-80', slow growth rate	Food: nuts Wildlife: wood duck, red-bellied woodpecker, fox, squirrels, beaver, rabbit, chipmunk, turkey, deer
Pignut Hickory <i>Carya glabra</i>	Light: shade to partial Moisture: dry to well drained	Bitter fruit, strong wood used for tools, fast growth rate, height 50'-60'	Food: fruit, seeds Wildlife: squirrel, chipmunk, deer
Hackberry <i>Celtis occidentalis</i>	Light: partial to full sun Moisture: wet to well drained	Adapted to a wide range of conditions, medium to fast growth rate, height 35'-60'	Food: fruit, twigs. Wildlife: mockingbird, robin, mourning dove, quail, bluebird, catbird, thrushes, sparrows, squirrel, deer.
American Beech <i>Fagus grandifolia</i>	Light: partial to full sun (prefers partial when young) Moisture: moist to well drained	Beautiful, smooth silvery white bark, excellent shade tree, slow growth rate height 50'-100'	Food: nuts, sap, buds. Wildlife: wood duck, quail, squirrel, chipmunk, woodpeckers, blue jay, tufted titmouse, chickadees, nuthatches
White Ash <i>Fraxinus americana</i>	Light: partial to full sun Moisture: moist to well drained	Yellow to dark maroon fall color, medium growth rate, height 50'-80'	Food: seeds foliage Wildlife: cardinal, finches, grosbeaks, wood duck, red-winged blackbird, squirrel, deer
Sweetgum <i>Liquidambar styraciflua</i>	Light: partial to full sun Moisture: wet to well drained	Adapted to wide range of conditions, yellow-red fall color, medium to fast growth rate, height 60'-80'	Food: seeds Wildlife: mourning dove, carolina wren, finches, junco, beaver, squirrel, chipmunk
Tulip Poplar <i>Liriodendron tulipifera</i>	Light: partial to full sun Moisture: moist to well drained	Graceful, large yellow flower, golden yellow fall color, fast growth rate, height 70'-120'	Food: seeds, sap, nectar Wildlife: chickadees, woodpeckers, cardinal, or more mocking bird, finches, hummingbird, honeybees

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Black Gum <i>Nyssa sylvatica</i>	Light: partial to full sun Moisture: wet to well drained	Beautiful, shiny green leaves, bright red fall color, bluish berries, slow growth rate, height 25'-35'	Food: berries Wildlife: wood duck, thrushes, woodpeckers, eastern kingbird, cedar waxwing squirrel
Sourwood <i>Oxydendrum arboreum</i>	Light: shade to full sun Moisture: well drained	Pyramidal shape with drooping branches, white flowers, brilliant scarlet fall color, slow growth rate, height 25'-35'	Food: twigs Wildlife: deer, provides nesting habitat for birds
Sycamore <i>Platanus occidentalis</i>	Light: partial to full sun Moisture: wet to well drained	Unique white and brown peeling bark, fast growth rate, among the tallest of native trees, height 75'-100'	Food: seeds Wildlife: finches, squirrel. Also provides nesting cavities.
Bald Cypress <i>Taxodium distichum</i>	Light: partial to full sun Moisture: flooded to wet	Tall graceful tree with feathery light green foliage, deciduous conifer, medium growth rate, height 50'-70'	Food: seeds Wildlife: ducks, marsh birds
White Oak <i>Quercus alba</i>	Light: partial to full sun Moisture: well drained	Majestic, light scaly bark, variable fall color, slow to medium growth rate, height, 50'-90'	Food: acorns are a very important food source Wildlife: quail, turkey, grouse, ducks, woodpeckers, blue jay, brown thrasher, towhee, nuthatch, squirrel, chipmunk, raccoon, gopher, opossum, deer
Red Oak <i>Quercus rubra</i>	Light: partial to full sun Moisture: well drained	Grows on a variety of soils and topography, important lumber species, moderate to fast growth rate, height 60'-75', transplants easily	Same as White Oak
Southern Red Oak <i>Quercus falcata</i>	Light: full sun Moisture: moist to well drained	Large crown and limbs, good shade tree, variable fall color, medium to slow growth rate, height 70'-80'	Same as White Oak
Swamp Chestnut Oak <i>Quercus michauxii</i>	Light: partial to full Moisture: moist to well drained near streams	Hard, tough, strong, wood used for veneer, boards, fuel and fence posts; and extensively for making baskets, moderate growth rate, height 60'-80'	Same as White Oak
Willow Oak <i>Quercus phellos</i>	Light: partial to full sun Moisture: moist to well drained	Adapted to a range of conditions, small willow like leaves, medium to fast growth rate, height 70'-80'	Same as White Oak
Shumard Oak <i>Quercus shumardii</i>	Light: full sun Moisture: dry to wet	Nearly identical to Northern Red Oak, leaves turn brown-red in fall, height 40'-60'	Same as White Oak
Post Oak <i>Quercus stellata</i>	Light: partial to full sun Moisture: dry to well drained	Medium-sized tree that is most abundant in dry poorer soils, slow growth rate, drought resistant, height 40'-50'	Same as White Oak
Black Oak <i>Quercus velutina</i>	Light: full sun Moisture: well drained	Similar to and often hybridizes with Red Oak, medium to fast growth rate, height 50'-60'	Same as White Oak

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Sassafras <i>Sassafras albidum</i>	Light: partial to full sun Moisture: moist to well drained	Dark green leaves of three different shapes, medium growth rate, height 30'-60'	Food: fruit Wildlife: quail, catbird, flycatchers, mockingbird, pileated woodpecker
UNDERSTORY TREES			
Downy Serviceberry <i>Amelanchier arborea</i>	Light: shade to full sun Moisture: wet to well drained	White flowers in early spring, blooms during shad run, edible berries in June, medium growth rate height 15'-30'	Food: berries, twigs. Wildlife: thrushes, brown thrasher, towhee, catbird, woodpeckers, orioles, tanagers, robin, junco, cardinal, squirrel, beaver, deer
Canada Serviceberry <i>Amelanchier canadensis</i>	Light: shade to full sun Moisture: wet to well drained	White flowers in early spring, blooms during shad run, edible berries in June, more shrub like than Downy Serviceberry, medium growth rate height 15'-30'	Food: berries, twigs. Wildlife: thrushes, crow, bluebird, brown thrasher, catbird, woodpeckers, tanagers, robin, junco, cardinal, squirrel, beaver, deer
Allegheny Serviceberry (Shad Bush) <i>Amelanchier laevis</i>	Light: partial to full sun Moisture: moist	Found in moist ravines and protected slopes, fruit is used as a preserve and in pies, moderate growth rate, height 15'-25'	Food: berries, twigs. Wildlife: thrushes, brown thrasher, catbird, woodpeckers, orioles, tanagers, robin, junco, cardinal, squirrel, beaver, deer
Ironwood <i>Carpinus caroliniana</i>	Light: shade to partial sun Moisture: wet to moist	Unique fluted gray bark, slow growth rate, height 20'-40'	Food: seeds, buds Wildlife: wood duck, quail, beaver, squirrel, deer
Redbud <i>Cercis canadensis</i>	Light: shade to full sun Moisture: moist to well drained	(Blooms best in full sun, but may lose drought tolerance) Understory tree of hardwood forests, bright purplish red flowers appear in early spring, moderate growth rate, height 20'-30'	Food: seeds, leaves Wildlife: butterflies, cardinal quail, pheasants, goldfinch, other birds, deer, squirrel
Fringetree <i>Chionanthus virginicus</i>	Light: shade to full sun Moisture: wet to well drained	Beautiful white flowers, fragrant blue fall berries, slow growth rate, height 8'-20'	Food: berries Wildlife: rabbit, deer
Flowering Dogwood <i>Cornus florida</i>	Light: shade to partial sun Moisture: well drained	Large white flowers symbolizing spring in the Eastern woodlands, red berries, slow to medium growth rate, height 15'-30'	Food: berries, foliage, twigs Wildlife: cardinals, robins, quail, woodpeckers, cedar waxwing, vireos, squirrel, rabbit
Silky Dogwood <i>Cornus amomum</i>	Light: partial to full sun Moisture: wet to moist	White flowers, bluish fruit, medium growth rate, height 6'-10'	Food: berries, twigs Wildlife: woodpeckers, vireos, cardinal, finches, pine warbler, deer
Silverbell <i>Halesia tetraptera</i>	Light: partial to full sun Moisture: moist to well drained	Dainty white bell shaped flowers in early spring, moderate growth rate, height 20' to 40'	Food: fruits Wildlife: squirrel, woodpeckers, other birds
American Holly <i>Ilex opaca</i>	Light: partial to full sun Moisture: moist to well drained	Dioecious, shiny green leaves, red berries on female plant, medium growth rate, height 20'-40'	Food: berries, sap Wildlife: thrushes, woodpeckers, mockingbird, mourning dove, squirrel, deer

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Sweetbay Magnolia <i>Magnolia virginiana</i>	Light: partial to full sun Moisture: wet to well drained	Almost evergreen waxy foliage, large white flowers, red berries, medium to fast growth rate, height 15'-30'	Food: seeds, twigs Wildlife: red-eyed vireo, woodpeckers, towhee, squirrel, deer
Eastern Hop Hornbeam <i>Ostrya virginiana</i>	Light: partial to full sun Moisture: moist to well drained	Graceful drooping branches, slow growth rate, height 20'-40'	Food: nuts buds Wildlife: wood duck quail, rabbit, deer, squirrel
LARGE SHRUBS			
Bottlebrush Buckeye <i>Aesculus parvifolia</i>	Light: partial shade to sun Moisture: moist	White flowers in summer golden yellow fall color, important food source for hummingbirds, height 8'-12'	Food: nectar, seeds Wildlife: hummingbirds, squirrel
Common (Smooth) Alder <i>Alnus serrulata</i>	Light: partial to full sun Moisture: wet	Tall with multiple trunks, small white flowers, good stream bank stabilizer, height 10'-20'	Food: seeds, buds Wildlife: ducks, quail, finches, mourning dove, deer
Red Chockcherry <i>Aronia arbutifolia</i>	Light: partial to full sun Moisture: wet to well drained	Small white flowers, bright red fruit, more fruit in full sun, slow growth rate, height 6'-10'	Food: berries, buds Wildlife: grouse, chickadees, cedar waxwing, meadowlark, squirrel
Black Chockcherry <i>Aronia melanocarpa</i>	Light: shade to full sun Moisture: wet to moist	More adapted to wetter areas than red chokecherry, dark purple berries, slow growth rate, height 3'-5'	Food: berries, buds Wildlife: grouse, chickadees, cedar waxwing, meadowlark, squirrel
American Beautyberry <i>Callicarpa Americana</i>	Light: Partial shade to sun Soil; moist to dry	Small white to pink flowers in summer; clusters of glossy pink-purple to red-violet berries, height 4'-6'	Food: berries Wildlife: berries attract a variety of birds
Carolina Allspice <i>Calycanthus floridus</i>	Light: shade to part sun Moisture: medium wet, well-drained, tolerant of a wide range of soils, prefers rich loams	Yellow fall foliage, stems and leaves are fragrant, grows somewhat taller in shade than in sun, height 6'-10'	Foliage provides browse for deer
Red Twig Dogwood <i>Cornus sericea</i>	Light: part shade to full sun Moisture: moist to wet	Bright red winter stems, small white flowers in late spring, height 6'-10'	Food: berries Wildlife: deer, rabbit, beaver, songbirds, quail, partridge, ducks, crows, and other birds
Greystem Dogwood <i>Cornus racemosa</i>	Light: shade to full sun Moisture: wet to moist	White flowers, white berries, slow growth rate, height 10'-15'	Food: berries, twigs Wildlife: woodpeckers, vireos, cardinal, finches, pine warbler, deer
Strawberrybush <i>Euonymus americanus</i>	Light: shade to partial sun Moisture: wet to dry	Green twigs, interesting red and orange fruit, medium growth rate, height 4'-7'	Food: foliage Wildlife: deer, rabbit
American Witch Alder <i>Fothergilla gardenii</i>	Light: partial shade to full sun Moisture: moist to wet	Creamy white flowers in spring with a sweet honey fragrance, orange to scarlet fall foliage, height 1.5'-3'	Food: seeds Wildlife: squirrel
Witch Hazel <i>Hamamelis virginiana</i>	Light: partial to full sun Moisture: moist to well drained	Small yellow flowers Oct.-Dec., medium growth rate, height 20'-25'	Food: seeds, twigs Wildlife: grouse, deer

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Wild Hydrangea <i>Hydrangea arborescens</i>	Light: part sun to shade Moisture: moist	Best grown in average, medium wet, well-drained soil in part shade, Yellowish brown fall foliage, height 3'-5'	Food: foliage, flowers Wildlife: bees, deer, turkey, some song birds
Oakleaf Hydrangea <i>Hydrangea quercifolia</i>	Light: part shade to full sun Moisture: medium wet, well drained	White flowers which slowly turn pinkish purple with age, long late spring to summer bloom period, leaves turn attractive shades of bronze, crimson or purple in autumn, height 4'-6'	Food: seeds Wildlife: seeds eaten by a variety of birds
Holly-Possumhaw <i>Ilex decidua</i>	Light: part shade to full sun Moisture: medium wet	Dioecious prefers moist, acidic, organic soils. Some tolerance for wet conditions, height 7'-15'	Food: berries Wildlife: opossum, woodpecker, cedar waxwing, thrushes, finches, cardinal, chickadees, deer
Inkberry <i>Ilex glabra</i>	Light: partial to full sun Moisture: wet to moist	Dioecious, evergreen, black berries, slow growth rate, height 6'-8'	Food: berries Wildlife: woodpecker, cedar waxwing, thrushes, finches, cardinal, chickadees, deer
Winterberry <i>Ilex verticillata</i>	Light: partial to full sun Moisture: wet to moist	Dioecious, bright red berries, slow growth rate. Height 6'-10'	Food: berries Wildlife: woodpecker, cedar waxwing, thrushes, finches, cardinal, chickadees, deer
Virginia Sweetspire <i>Itea virginica</i>	Light: shade to full sun Moisture: moist to well drained	Fragrant white flowers in mid-summer, slow to medium growth rate, height 3'-5'	Nectar provides food for some songbirds, butterflies, other insects
Yaupon Holly <i>Ilex vomitoria</i>	Light: shade to full sun Moisture: moist to dry	Provides year round cover for many types of wildlife, small, shiny red-orange berries on female plants that persist into the winter, moderate to fast growth rate, height 15'-20'	Food: berries Wildlife: turkey, bobwhite, many songbirds, deer
Dwarf Yaupon Holly <i>Ilex vomitoria 'nana'</i>	Light: shade to full sun Moisture: moist to dry	Provides year round cover for many types of wildlife, small, shiny red-orange berries on female plants that persist into the winter, moderate to fast growth rate, height 5'	Food: berries Wildlife: turkey, bobwhite, many songbirds, deer
Mountain Laurel <i>Kalmia latifolia</i>	Light: shade to full sun Moisture: moist to well drained	Evergreen, showy white to pink flowers, slow growth rate, height 7'-15'	Attracts butterflies
Sweetbells <i>Leucothoe racemosa</i>	Light: partial shade to full sun Moisture: moist to wet	Found along marshy stream banks, and forest edges, showy, fragrant flowers May-June, height 4'-6'	Attracts birds and butterflies
Spicebush <i>Lindera benzoin</i>	Light: shade to full sun Moisture: wet to well drained	Fragrant twigs and leaves, red berries, yellow fall color, slow growth rate height 6'-12'	Food: berries Wildlife: thrushes, catbird, kingbird
Southern Wax Myrtle <i>Myrica cerifera</i>	Light: part sun to full sun Moisture: dry to moist	Evergreen small tree or shrub, leaves fragrant when crushed	Food: berries on female plants Wildlife: small mammals and a variety of birds

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Flame Azalea Rhododendron calendulaceum	Light: partial to full sun Moisture: well drained to dry	Deciduous, showy yellow to red orange flowers, slow growth rate, height 4'-7'	Food: leaves, nectar Wildlife: hummingbird, deer, butterflies, other insects
Carolina Rhododendron Rhododendron carolinianum	Light: partial shade to full sun Moisture: moist, well drained	Flowers in early spring, crushed leaves have an aromatic fragrance	Food: leaves Wildlife: deer, winter cover for songbirds
Catawba Rhododendron Rhododendron catawbiense	Light: shade to full sun Moisture: moist, well drained	Evergreen species that produces showy purple or pink blooms	Wildlife: Serves as cover for songbirds, gamebirds, and small mammals (especially in Winter)
Rosebay Rhododendron Rhododendron maximum	Light: partial shade to full sun Moisture: moist, well drained	One of largest and hardiest of Rhododendrons, white or purplish flowers, height 15'-30'	Wildlife: a good cover tree for birds and small mammals, especially during colder or windy weather
Pinxterbloom Azalea Rhododendron periclymenoides	Light: partial shade to sun Moisture: moist, well drained	Variable flower color but often is cotton candy pink to white, flowers before leaves emerge, some are fragrant, height 6'-10'	Food: leaves, nectar Wildlife: hummingbird, deer, butterflies, other insects
Swamp Azalea Rhododendron viscosum	Light: shade to partial sun Moisture: wet to moist	Deciduous, white flowers, slow growth rate, height 3'-8'	Food: leaves, nectar Wildlife: hummingbird, deer, butterflies, other insects
Winged Sumac Rhus copallina	Light: part sun to full sun Moisture: dry to medium	Greenish white flowers in upright cluster; conical cluster moisture of dark red small fruit, height 10'-15'	Food: seeds, foliage flowers Wildlife: deer, thrushes, vireos, woodpecker, other songbirds and small mammals, butterflies
Smooth Sumac Rhus glabra	Light: full sun Moisture: well drained to dry	Dioecious, forms groves, greenish crimson colored fruit, bright red fall color, fast growth rate, height 9'-15'	Food: fruit, twigs, foliage Wildlife: quail, bluebird, catbird, robin, mockingbird, rabbit, deer
American Snowbell Styrax americanus	Light: partial shade to full sun Moisture: moist	White flowers in mid spring; sweet fragrance, height 6'-10'	Fruit eaten by a variety of birds, provides habitat for wildlife
Highbush Blueberry Vaccinium corymbosum	Light: partial to full sun Moisture: wet to well drained	Small urn-shaped white flowers, blue berries, slow growth rate, height 6'-12'	Food: berries, foliage, twigs Wildlife: grouse, woodpeckers, kingbird, blue jay, robin, bluebird, tanagers, squirrel
Lowbush Blueberry Vaccinium angustifolium	Light: partial to full sun Moisture: well drained to dry	Low growing, small white flowers, slow growth rate, height 1'-2'	Food: berries, foliage Wildlife: grouse woodpeckers, kingbird, blue jay, robin, orioles, tanagers, squirrel
Sparkleberry Vaccinium arboreum	Light: partial shade to sun Soil; dry to moist, drought tolerant	Largest of the native blueberries, small, fragrant white flowers in spring, berries last into winter, height 6'-20'	Food: blueberries Wildlife: many species of songbirds, wild turkey, ruffed grouse, nectar plant for butterflies, larva food for Henry's elfin butterflies

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Mapleleaf Viburnum <i>Viburnum acerifolium</i>	Light: shade to full sun Moisture: moist, well drained	White flowers in early Summer, can form dense colonies, height 7'	Food: berries (often persists well into winter) Wildlife: many songbirds, gamebirds, and small mammals, deer
Arrowwood <i>Viburnum dentatum</i>	Light: partial to full sun Moisture: moist to well drained	Dense foliage, white flowers, small blue-black berries, wood used to make arrows, medium growth rate, height 6'-10'	Food: berries, foliage Wildlife: grouse, cedar waxwing, brown thrasher, squirrel deer
Swamp Viburnum (Wild Rasin) <i>Viburnum nudum</i>	Light: shade to full sun Moisture: moist	Typical of wet sites, small white flower in May, 6-8 feet tall	Food: leaves, twigs Wildlife: deer
Blackhaw Viburnum <i>Viburnum prunifolium</i>	Light: partial to full sun Moisture: moist to well drained	White flower clusters, blue berries, red fall color, slow to medium growth rate, height 12'-15'	Food: berries, foliage Wildlife: grouse cedar waxwing, brown thrasher, squirrel deer
SMALL SHRUBS & GROUNDCOVERS			
Bearberry <i>Arctostaphylos uva-ursi</i>	Light: full sun Moisture: dry, well drained	Evergreen ground cover, bright red berries persist on plants through winter,	Food: berries Wildlife: Fruits eaten by songbirds and gamebirds
Wintergreen <i>Gaultheria procumbens</i>	Light: full shade to part sun Moisture: moist, well drained, will not tolerate drought	Flowers are urn-shaped, white with hints of pink, blooms May through summer, fragrant leaves and fruit	Food: berries Wildlife: deer chipmunk, fox, squirrel, bobwhite, mouse
Shore Juniper <i>Juniperus conferta</i>	Light: full sun Moisture: dry, well drained	Does not like wet feet; blue-green color; slow growth, height 10"	Groundcover that can be used to control erosion on slopes. Low maintenance
Creeping Juniper <i>Juniperus horizontalis</i>	Light: full sun Moisture: dry to medium wet, well drained	A flat, low-growing, evergreen shrub, creeps horizontally and roots where it touches the ground, 4-6" tall, medium green foliage with blue overtones, becomes tinged with burgundy in winter, berry-like seed cones infrequently produced.	Groundcover that can be used to control erosion on slopes. Low maintenance
Evergreen Blueberry <i>Vaccinium darrowii</i>	Light: partial sun to shade Moisture: dry to moist	Small evergreen shrub, produces fruit in late spring	Food: fruit Wildlife: deer, other mammals, birds
ADDITIONAL PERENNIALS (May be used in RPA, but not as a replacement for woody vegetation.)			
Columbine <i>Aquilegia canadensis</i>	Light: part shade to full sun Moisture: moist well drained Tolerates a wide range of soils.	Red and yellow flowers in spring, prefers rich, moist soils with light to moderate shade	Food: nectar Wildlife: hummingbird
Jack In The Pulpit <i>Arisoema triphyllum</i>	Light: shade to partial shade Moisture: moist to wet, rich hummus	Needs constantly moist soil rich in organic matter, does poorly in heavy clay soils, may be grown from seed, but takes five years for plant to flower, best left undisturbed in the, wild or native plant garden	

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Wild Ginger <i>Asarum canadense</i>	Light: shade Moisture: rich moist	Dark green leaves, perennial, purplish blooms usually hidden by foliage	
New England Aster <i>Aster novae-angliae</i>	Light: partial to full sun Moisture: wet to moist	Purple/violet flowers Sept.-Nov., height 2'-5'	Food: nectar, seeds, leaves Wildlife: butterflies, other insects, limited use by birds and small mammals
New York Aster <i>Aster novi-belgii</i>	Light: full sun Moisture: medium moisture	Typically grows 12-15" tall, features a profuse bloom of clear rose flowers (to 1.5" across) which can entirely cover the plant with bloom from mid-August until early October	Attracts butterflies
Flat-top White Aster <i>Aster umbellatus</i>	Light: part to full sun Moisture: moist to wet	White flowers, blooms July-Sept., height 1-7', one of the first asters to bloom	Attracts butterflies
Green and Gold <i>Chrysogonum virginianum</i>	Light: part shade to shade Moisture: well drained	Height 6" to 9" star shaped bright yellow flowers in spring, sporadically in summer	Good ground cover for naturalized areas
Dwarf Larkspur <i>Delphinium tricorn</i>	Light: part shade to sun Moisture:	Blue, white, purple, pink flowers in spring, height 18-36"	Attracts butterflies
Dutchman's Breeches <i>Dicentra cucullaria</i>	Light: part shade to full shade Moisture: moist	Early spring, wildflower which typically occurs on forest and along streams, fragrant white, pantaloons shaped flowers, height 1'	
Bleeding Heart <i>Dicentra eximia</i>	Light: part to full shade Moisture: rich moist, well drained. Intolerant of wet soils in winter and dry soils in summer.	Rose pink to purplish red flowers, Naturalizes by self-seeding in favorable environments	Nectar and seeds attract butterflies and birds
Purple Coneflower <i>Echinacea purpurea</i>	Light: full sun Moisture: moist to well drained	Large daisy-like purple flowers June-July, height 3'-4'	Food: nectar, seeds Wildlife: butterflies, other insects, goldfinch
Joe Pye Weed <i>Eupatorium fistulosum</i>	Light: partial to full sun Moisture: wet to moist	Large purple/white flower clusters July-Aug., height 5'-10'	Food: nectar Wildlife: butterflies, other insects
Dwarf Iris <i>Iris cristata</i>	Light: partial shade to full sun Moisture: organically rich, well drained, medium moisture	Grows best in part shade, will tolerate close to full shade, soil must be kept consistently moist in full sun, grows well on well-drained slopes.	Attracts butterflies
Virginia Blueflag <i>Iris virginica</i>	Light: full sun Moisture: medium to wet, best grown in wet, boggy, acidic, sandy soils	Violet to blue flowers with yellow and white falls, height 1'-3'	Attracts hummingbirds and butterflies
Cardinal flower <i>Lobelia cardinalis</i>	Light: partial to full sun Moisture: wet to moist	Brilliant red tubular shaped flowers July-Sept., height 2'-3'	Food: nectar Wildlife: hummingbird, butterflies, other insects

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Virginia Bluebells <i>Mertensia virginica</i>	Light: partial shade Moisture: moist, cool, high in organic matter	One of the most beautiful native wildflowers, blue/pink flowers in early spring, height 12-24"	Food: nectar Wildlife: hummingbird, butterflies, other insects
Bee Balm <i>Monarda didyma</i>	Light: full sun Moisture: moist to well drained	Scarlet colored tubular-shaped flowers June- Aug., height 2'-4'	Food: nectar Wildlife: hummingbirds, butterflies, other insects
Woodland Phlox <i>Phlox divaricata</i>	Light: part shade to full sun Moisture: medium wet, well drained	Occurs in rich woods, fields and along streams. Loose clusters of slightly fragrant, tubular, lilac to rose to blue flowers, can form large colonies as leafy shoots spread along the ground height, 12-15"	Food: nectar Wildlife: hummingbird, butterflies, other insects
Solomon's Seal <i>Polygonatum commutatum</i>	Light: shade to partial shade Moisture: rich moist humus	Creamy green flowers, in spring with blue-black fruits in early to midsummer	Food: berries Wildlife: birds, small mammals
Black-eyed Susan <i>Rudbeckia fulgida</i> or <i>Rudbeckia laciniata</i>	Light: partial to full sun Moisture: moist to well drained	Yellow flowers with dark center June- Aug., height 2'-3'	Attracts butterflies
FERNS (May be used in RPA, but not as a replacement for woody vegetation.)			
Southern Ladyfern <i>Athyrium asplenoides</i>	Light: shade Moisture: moist	Slow spreading fern 1'-3' tall. Prefers to have its feet wet. Can grow in woods and in the open. Will make a dense stand over time	
Cinnamon Fern <i>Osmunda cinnamomea</i>	Light: full shade to part shade Moisture: medium to wet	Native fern which occurs in moist, boggy ground along streams and on shaded ledges, Typically grows in clumps to 2-3' tall, but with constant moisture can reach 6' in height	
Royal Fern <i>Osmunda regalis</i>	Light: full shade to part shade Moisture: medium to wet	Prefers moist, rich, humusy, acidic soils, but adapts to lesser conditions. Grows in clumps to 2-3' tall, but with constant moisture can reach 6' in height.	
Christmas Fern <i>Polystichum acrostichoides</i>	Light: full to part shade Moisture: dry to medium	Evergreen fronds provide good winter interest for the landscape. A good plant for massing on slopes (including dryish, rocky ones) to help combat soil erosion.	
VINES (May be used in RPA, but not as a replacement for woody vegetation.)			
Crossvine <i>Bignonia capreolata</i>	Light: part shade to full sun Moisture: medium moisture	Fast growing vine with orange-red flowers, typically grows 35-50', similar to Trumpetvine	Food: nectar Wildlife: hummingbird, bees

COMMON NAME/ SCIENTIFIC NAME	GROWTH CONDITIONS	CHARACTERISTICS	BENEFITS
Trumpetvine <i>Campsis radicans</i>	Light: partial shade to sun Moisture: medium moisture (grows in most soils)	A woody vine which grows up to 30 feet tall, best known for its magnificent bright red of flowers, can be invasive	Food: nectar Wildlife: a major food source Ruby-throated Hummingbirds, used by goldfinch for cover
Virgin's Bower <i>Clematis virginiana</i>	Light: partial shade to sun Moisture: dry to moist (prefers moist)	White flowers in late summer to fall, fast growing, height 18"	
Virginia Creeper <i>Parthenocissus quinquefolia</i>	Light: shade to full sun Moisture: medium wet, well drained	Climbing vine, can grow up to 50 feet, five leaved plant often confused with poison ivy, rapid growth rate	Food: berries, leaves, stems Wildlife: bluebird, cardinal, chickadees, woodpeckers, mice, skunk, chipmunk, squirrel, deer

Invasive Plants

The following list contains non-native plants that should not be used in an RPA restoration. These plants can be invasive in the right conditions and will smother vegetation. This can cause the ecosystem to lose plant diversity and destroy habitat and food sources for wildlife.

Highly Invasive Species

Tree-of-heaven <i>Ailanthus altissima</i>	Japanese honeysuckle <i>Lonicera japonica</i>
Garlic mustard <i>Alliaria petiolata</i>	Morrow's honeysuckle <i>Lonicera morrowii</i>
Alligator weed <i>Alternanthera philoxeroides</i>	Standish's honeysuckle <i>Lonicera standishii</i>
Porcelain-berry <i>Ampelopsis brevipedunculata</i>	Purple loosestrife <i>Lythrum salicaria</i> & <i>L. virgatu</i>
Asiatic sand sedge <i>Carex kobomugi</i>	White sweet clover <i>Melilotus alba</i>
Oriental bittersweet <i>Celastrus orbiculata</i>	Yellow sweet clover <i>Melilotus officinalis</i>
Short-fringed knapweed <i>Centaurea dubia</i>	Japanese stilt grass <i>Microstegium vimineum</i>
Spotted knapweed <i>Centaurea maculosa</i>	Aneilima <i>Murdannia keisak</i>
Canada thistle <i>Cirsium arvense</i>	Parrot feather <i>Myriophyllum aquaticum</i>
Scotch Broom <i>Cytisus scoparius</i>	European water-milfoil <i>Myriophyllum spicatum</i>
Chinese yam <i>Dioscorea oppositifolia</i>	Common reed <i>Phragmites australis</i>
Autumn olive <i>Elaeagnus umbellata</i>	Japanese knotweed <i>Polygonum cuspidatum</i>
Winged burning bush <i>Euonymus alata</i>	Mile-a-minute <i>Polygonum perfoliatum</i>
Hydrilla <i>Hydrilla verticillata</i>	Kudzu vine <i>Pueraria lobata</i> (<i>P. montana</i>)
Cogon grass <i>Imperata cylindrica</i>	Lesser celandine <i>Ranunculus ficaria</i>
Chinese lespedeza <i>Lespedeza cuneata</i>	Multiflora rose <i>Rosa multiflora</i>
Chinese privet <i>Ligustrum sinense</i>	Wineberry <i>Rubus phoenicolasius</i>
	Johnson-grass <i>Sorghum halepense</i>

Moderately Invasive Species

Norway maple <i>Acer platanoides</i>	Ivy-leaved morning-glory <i>Ipomoea hederacea</i>
Quack grass <i>Agropyron repens</i>	Common morning-glory <i>Ipomoea purpurea</i>
Rhode Island bent-grass <i>Agrostis tenuis</i>	Yellow flag <i>Iris pseudacorus</i>
Five-leaf akebia <i>Akebia quinata</i>	Shrubby bushclover <i>Lespedeza bicolor</i>
Wild onion <i>Allium vineale</i>	Blunt-leaved privet <i>Ligustrum obtusifolium</i>
Mugwort <i>Artemisia vulgaris</i>	Amur honeysuckle <i>Lonicera maackii</i>
Jointed grass <i>Arthraxon hispidus</i>	Tartarian honeysuckle <i>Lonicera tatarica</i>
Giant reed <i>Arundo donax</i>	Moneywort <i>Lysimachia nummularia</i>
Japanese barberry <i>Berberis thunbergii</i>	China-berry <i>Melia azedarach</i>
Balloon vine <i>Cardiospermum halicacabum</i>	Princess tree <i>Paulownia tomentosa</i>
Musk thistle <i>Carduus nutans</i>	Timothy <i>Phleum pratense</i>
Sickle pod <i>Cassia obtusifolia</i>	Golden bamboo <i>Phyllostachys aurea</i>
Brown knapweed <i>Centaurea jacea</i>	Canada bluegrass <i>Poa compressa</i>
Bull-thistle <i>Cirsium vulgare</i>	Rough bluegrass <i>Poa trivialis</i>
Field-bindweed <i>Convolvulus arvensis</i>	Bristled knotweed <i>Polygonum cespitosum</i>
Cut-leaf teasel <i>Dipsacus laciniatus</i>	White poplar <i>Populus alba</i>
Common teasel <i>Dipsacus sylvestris</i>	Jointed charlock <i>Raphanus raphanistrum</i>
Brazilian water-weed <i>Egeria densa</i>	Red sorrel <i>Rumex acetosella</i>
Wintercreeper <i>Euonymus fortunei</i>	Curled dock <i>Rumex crispus</i>
Tall fescue <i>Festuca elatior</i> (F. <i>pratensis</i>)	Giant foxtail <i>Setaria faberi</i>
Fennel <i>Foeniculum vulgare</i>	Japanese spiraea <i>Spiraea japonica</i>
Gill-over-the-ground <i>Glechoma hederacea</i>	Common chickweed <i>Stellaria media</i>
English ivy <i>Hedera helix</i>	Ivy-leaved speedwell <i>Veronica herderifolia</i>
Velvet-grass <i>Holcus lanatus</i>	Chinese wisteria <i>Wisteria sinensis</i>
Japanese hops <i>Humulus japonicus</i>	Common cocklebur <i>Xanthium strumarium</i>

Occasionally Invasive Species

Redtop <i>Agrostis gigantea</i>	Sweet breath of spring <i>Lonicera fragrantissima</i>
Bugleweed <i>Ajuga reptans</i>	Bell's honeysuckle <i>Lonicera x bella</i>
Mimosa <i>Albizia julibrissin</i>	Birdsfoot trefoil <i>Lotus corniculatus</i>
Oatgrass <i>Arrhenatherum elatius</i>	Silver grass <i>Miscanthus sinensis</i>
Common dayflower <i>Commelina communis</i>	White mulberry <i>Morus alba</i>
Poison hemlock <i>Conium maculatum</i>	Wild parsnip <i>Pastinaca sativa</i>
Crown-vetch <i>Coronilla varia</i>	Beefsteak plant <i>Perilla frutescens</i>
Orchard grass <i>Dactylis glomerata</i>	Black pine <i>Pinus thunbergii</i>
Russian olive <i>Elaeagnus angustifolia</i>	Sawtooth oak <i>Quercus acutissima</i>
Thorny elaeagnus <i>Elaeagnus pungens</i>	Water chestnut <i>Trapa natans</i>
Weeping lovegrass <i>Eragrostis curvula</i>	Siberian elm <i>Ulmus pumila</i>
Leafy spurge <i>Euphorbia esula</i>	Linden viburnum <i>Viburnum dilatatum</i>
Red morning-glory <i>Ipomoea coccinea</i>	Periwinkle <i>Vinca minor</i> & <i>V. major</i>
Nipplewort <i>Lapsana communis</i>	Japanese wisteria <i>Wisteria floribunda</i>

List of Nurseries for Native Plants from the Virginia Native Plant Society

(Compiled by Nancy Arrington, former Horticulture Chair, Virginia Native Plant Society.)

The following is a list of nurseries whose stock is partially or entirely made up of native plants. It is not intended to be exclusive. There may be other nurseries stocking native plants as well. This is a list of suppliers and is not to be construed as an endorsement of those suppliers.

Lists of plants suggested for conservation, restoration and landscaping in Virginia and lots of other relevant information can be found at care of Virginia's Natural Heritage Program. <http://www.dcr.state.va.us/dnh/>

(Nursery list from *Riparian Buffers Guidance Manual Chesapeake Bay Local Assistance Department and the Chesterfield County Department of Environmental Engineering*, 2007)

Botanique
387 Pitcher Plant Lane
Stanardsville, VA 22973
robc@pitcherplant.com
www.pitcherplant.com

Bobtown Nursery
16212 Country Club Road
Melfa VA 23410
(757) 787-8484
bobtownnursery@verizon.net

Edible Landscaping
361 Spirit Ridge Lane
Afton, VA 22920
434-361-9134
www.ediblelandscaping.com

Pinelands Nursery
8877 Richmond Road
Toano, VA 23168
(800) 667-2729
sales@pinelandsnursery.com
www.pinelandsnursery.com

Meadowview Biological Research Station
8390 Fredericksburg Turnpike
Woodford, VA 22580
phone/fax: (804) 633-4336 / (804) 633-5056
meadowview@pitcherplant.org
www.pitcherplant.org

Joseph Brown Native Seeds & Plants
7327 Hoefork Lane
Gloucester Point, VA 23062
(804) 642-0736

Sassafras Farm
7029 Bray Road
Hayes, VA 23072
(804) 642-0923
sassafrasfarm@verizon.net

Bibliography and References

Riparian Buffers Guidance Manual Chesapeake Bay Local Assistance Department
Native Plants For Wildlife Habitat U. S. Fish and Wildlife Service Chesapeake Bay Office in Cooperation with Irvine Natural Science Center and Adkins Arboretum
Gilchrist, Drew *Native Trees and Shrubs and Their Wildlife Users* Natual Land Trust
Native Plants For Conservation, Restoration & Landscaping Virginia Department of Conservation and Recreation
Chesterfield Native Landscapes Friends of Chesterfields Riverfront and Virginia Department of Forestry
United States Department of Agriculture Fire Effects Information Web Page
Plant Fact Sheets North Carolina Cooperative Extension Office
University of Connecticut Plant Data Base
MGB Kemper Center For Home Gardening Plant Finder - <http://www.mobot.org/gardeninghelp/plantfinder/service.shtml>

RPA Form 1: Site Analysis

Name: _____ Phone: _____

Address: _____

Area of disturbance: _____ square feet

RPA Form 2: Planting Plan

Name: _____ Phone: _____

Address: _____

Area of disturbance: _____ square feet

Planting Schedule: _____ Planting Cost: _____

Planting Calculations

_____ SF/400 SF Units = _____ Units

<u>Units</u>	X	<u>Plant/Unit</u>	=	<u>Number of Plants</u>
_____ Units		1 canopy tree	_____	Canopy Trees
		2 understory trees	_____	Understory Trees
		3 small shrubs	_____	Small Shrubs

***Please attach a plant list to this form**

